

CLAIMS

What is claimed is:

1. A method for stimulating using a neural stimulation implant system comprising:
 - determining a threshold neural response elicited from application of at least one stimulus having a known amplitude and pulse width;
 - determining the charge associated with the stimulus that produced the threshold neural response; and
 - setting the program levels of the stimuli applied by the implant system during its operation to stimuli having approximately the same charge as the charge of the stimulus that produced the threshold neural response.
2. The method of Claim 1 wherein determining a threshold neural response comprises
 - applying a multiplicity of stimuli, each applied stimuli having a different intensity level associated therewith,
 - measuring a corresponding neural response associated with application of each one of the multiplicity of stimuli,
 - defining a data point for each applied stimulus and its corresponding neural response, thereby defining a multiplicity of data points, and
 - analyzing the multiplicity of data points to determine the threshold neural response.
3. The method of Claim 2 wherein measuring a corresponding neural response associated with application of each one of the multiplicity of stimuli comprises measuring a first peak N1 of one polarity of a neural response, and measuring a second peak P1 of an opposite polarity of the neural response, and

determining the measured neural response to be the N1-P1peak-to-peak difference.

4. The method of Claim 3 wherein analyzing the multiplicity of data points to determine the threshold neural response comprises:

plotting the multiplicity of data points on a graph, wherein the intensity level of the applied stimulus comprises a first axis of said graph, and the measured neural response associated with the applied stimulus comprises a second axis of said graph;

fitting a data line to the multiplicity of data points plotted on the graph;

determining an intersection point at which an extrapolation of the data line intersects with the first axis of the graph; and

setting the threshold neural response as the intersection point.

5. The method of Claim 4 wherein fitting a data line to the multiplicity of data points comprises fitting a straight line to the multiplicity of data points.

6. The method of Claim 2 wherein applying a multiplicity of stimuli, each applied stimuli having a different intensity level associated therewith, comprises applying stimuli having different pulse amplitudes and a fixed pulse width, and wherein determining the charge associated with the stimulus that produced the threshold neural response comprises multiplying the amplitude of the threshold neural response by the fixed pulse width.

7. The method of Claim 2 wherein applying a multiplicity of stimuli, each applied stimuli having a different intensity level associated therewith, comprises applying stimuli having different pulse widths and a fixed pulse amplitude, and wherein determining the charge associated with the stimulus that

produced the threshold neural response comprises multiplying the pulse width of the threshold neural response by the fixed pulse amplitude.

8. A method for fitting a cochlear implant system comprising:
 - measuring a plurality of neural responses elicited from a corresponding plurality of applied stimuli, each applied stimuli having a different intensity level associated therewith;
 - determining a tNRI value from the measured plurality of neural responses;
 - using the tNRI value to guide the selection of an initial operating point for the cochlear implant system by:
 - determining the charge level associated with the tNRI value, where charge level is defined as pulse width X pulse amplitude, and
 - setting the programmed levels used by the cochlear implant system to stimuli having approximately the same charge as the charge associated with the tNRI value.

9. The method for fitting of Claim 8 wherein determining a tNRI value comprises:
 - plotting the measured neural responses as data points on a graph having the applied stimuli as a first axis and the measured neural response as a second axis,
 - making a straight line approximation of the plotted data points, and determining the tNRI value as the value corresponding to the intersection of the straight line approximation of the plotted data points with the first axis.
10. A neural stimulation system comprising an implantable pulse generator, an electrode array attached to the pulse generator, and control

circuitry for controlling operation of the implantable pulse generator, wherein the control circuitry includes:

means for determining a threshold neural response elicited from application of at least one stimulus having a known amplitude and pulse width;

means for determining the charge associated with the stimulus that produced the threshold neural response; and

means for setting the program levels of the stimuli applied by the implant system during its operation to stimuli having approximately the same charge as the charge of the stimulus that produced the threshold neural response.

11. The neural stimulation system of Claim 10 wherein the means for determining a threshold neural response comprises

means for applying a multiplicity of stimuli, each applied stimuli having a different intensity level associated therewith,

means for measuring a corresponding neural response associated with application of each one of the multiplicity of stimuli,

means for defining a data point for each applied stimulus and its corresponding neural response, thereby defining a multiplicity of data points, and

means for analyzing the multiplicity of data points to determine the threshold neural response.

12. The neural stimulation system of Claim 11 wherein the means for measuring a corresponding neural response associated with application of each one of the multiplicity of stimuli comprises means for measuring a first peak N1 of one polarity of a neural response, and means for measuring a second peak P1 of an opposite polarity of the neural response, and means for determining the measured neural response to be the N1-P1peak-to-peak difference.

13. The neural stimulation system of Claim 11 wherein the means for analyzing the multiplicity of data points to determine the threshold neural response comprises:

means for plotting the multiplicity of data points on a graph, wherein the intensity level of the applied stimulus comprises a first axis of said graph, and the measured neural response associated with the applied stimulus comprises a second axis of said graph;

means for fitting a data line to the multiplicity of data points plotted on the graph;

means for determining an intersection point at which an extrapolation of the data line intersects with the first axis of the graph; and

means for setting the threshold neural response as the intersection point.

14. The neural stimulation system of Claim 13 wherein the means for fitting a data line to the multiplicity of data points comprises means for applying a linear-regression line to the multiplicity of data points.

15. The neural stimulation system of Claim 10 wherein the neural stimulation system comprises an implantable cochlear stimulation system.

16. The neural stimulation system of Claim 10 wherein the neural stimulation system comprises a spinal cord stimulation system.